KDMSW8x4_Manual.qxd 1/4/06 1:07 PM Page 1

Key digital®

The Experts in Digital Video Technology and Solutions®

Key Digital®, led by digital video pioneer Mike Tsinberg, develops and manufactures high quality, cutting-edge technology solutions for virtually all applications where high quality video imaging is important. Key Digital® is at the forefront of the video industry for Home Theater Retailers, Custom Installers, System Integrators, Broadcasters, Manufacturers, and Consumers. We provide total video system solutions because we know and help drive the technology, the industry, the business, and all the latest up-and-coming standards. But most of all, we know exactly what you need for your unique application - the right solution.

Rev 0 - December 2005

521 East 3rd Street, Mount Vernon, NY 10553
Phone: 914.667.9700 Fax: 914.668.8666
Web: www.keydigital.com

FAT BOY SERIES

KD-MSW8x4 HDTV Matrix Switcher

8 Inputs to 4 Outputs HDTV Matrix Switcher

OPERATING INSTRUCTIONS

These Operating Instructions apply to the entire Key Digital® Fat Boy Series line of HDTV Matrix Switchers:

KD-MSW8x4	8x4 HDTV Matrix Switcher (single base unit)
KD-MSW8x4 - 8x8	8x8 HDTV Matrix Switcher (2 base units of 8x4 and Cable Kit)
KD-MSW8x4 - 8x12	8x12 HDTV Matrix Switcher (3 base units of 8x4 and Cable Kit)
KD-MSW8x4 - 8x16	8x16 HDTV Matrix Switcher (4 base units of 8x4 and Cable Kit)
KD-MSW8x4 - 8x20	8x20 HDTV Matrix Switcher (5 base units of 8x4 and Cable Kit)
KD-MSW8x4 - 8x24	8x24 HDTV Matrix Switcher (6 base units of 8x4 and Cable Kit)
KD-MSW8x4 - 8x28	8x28 HDTV Matrix Switcher (7 base units of 8x4 and Cable Kit)
KD-MSW8x4 - 8x32	8x32 HDTV Matrix Switcher (8 base units of 8x4 and Cable Kit)
KD-MSW8x4 - 8x36	8x36 HDTV Matrix Switcher (9 base units of 8x4 and Cable Kit)
KD-MSW8x4 - 8x40	8x40 HDTV Matrix Switcher (10 base units of 8x4 and Cable Kit)
KD-MSW8x4 - 8x44	8x44 HDTV Matrix Switcher (11 base units of 8x4 and Cable Kit)

The **KD-MSW8x4 HDTV Matrix Switcher** by Key Digital® delivers the next-generation in professional Video/Audio switching technology, today. Perfect for studios, retail displays, demos, home theater systems, and board room applications alike, this massively expandable and versatile Fat Boy Series component line sets the gold standard for matrix switching of all of your video and audio sources to a seemingly infinite number of displays.

The **KD-MSW8x4 HDTV Matrix Switcher** series seamlessly switches eight (8) sets of Component Video (YPbPr) and/or RGBHV Video sources, as well as analog or digital (PCM) Audio. You'll be impressed with the new, professional Fade-to-Black and Video Mute features. With the base unit, you can switch all of your DVD players, Satellite boxes, game boxes, Cable TV Set Top Boxes, DVR's, and other sources, to as many as four (4) separate displays. Truly amazing, the outputs of the Fat Boy Series are expandable in multiples of four, from 8x4 all the way up to 8x44 true matrix switching. **Only operate the KD-MSW8x4 HDTV Matrix Switcher Series with the Key Digital® external Power Supply provided with your unit.**

HDTV CERTIFIED 480p · 720p · 1080i · 1080p RS-232 Control4 CRESTRON ELAN HOME SYSTEMS AMX CE cULus

Key digital®

The Experts in Digital Video Technology and Solutions®

KDMSW8x4_Manual.qxd 1/4/06 1:07 PM Page 3

KDMSW8x4 Operating Instructions

CAUTION!

Fat Boy Series KD-MSW8x4 HDTV Matrix Switcher

8 Inputs to 4 Outputs HDTV Matrix Switcher and Fat Boy Expansion

CAUTION: YOUR BASE KD-MSW8x4 HDTV MATRIX SWITCHER (AND EACH FAT BOY SERIES EXPANSION UNIT) COMES WITH ITS OWN EXTERNAL POWER SUPPLY THAT MUST BE ATTACHED TO EACH UNIT.

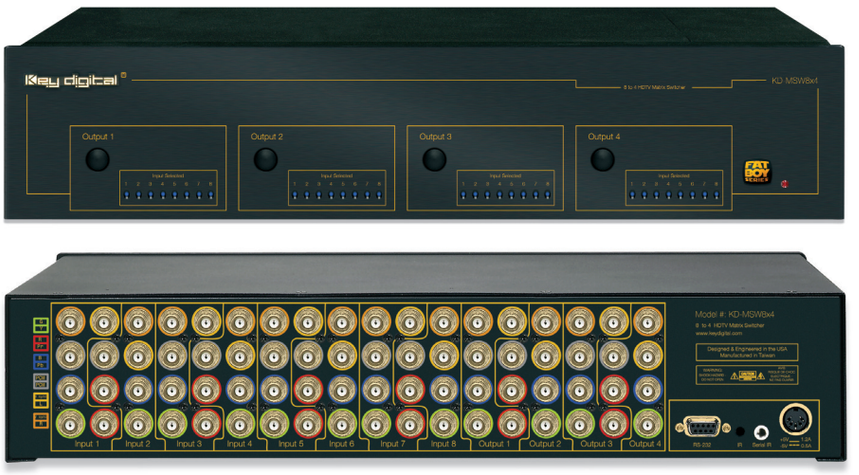
No other Power Supply Adapter can be used with any KD-MSW8x4 unit! Using a Power Supply other than the one(s) provided by Key Digital with your unit(s) VOIDS THE ENTIRE PRODUCT WARRANTY, may cause damage to your unit and associated equipment, and is a potential safety hazard.

You MUST use the Power Supply that came with your unit:

+ 6V DC @ 5 Amps, 110-240 VAC, 50-60 Hz

KDMSW8x4_Manual.qxd 1/4/06 1:07 PM Page 5

FAT BOY SERIES KD-MSW8x4 HDTV Matrix Switcher



KDMSW8x4 Operating Instructions

Safety Instructions – Please be sure to follow these instructions for safe operation of your unit

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

KDMSW8x4_Manual.qxd 1/4/06 1:07 PM Page 7

Table of Contents

Introduction 1
Getting Started 4
Basic Operation 11
IR Remote Control 13
Fat Boy Expansion of the Base KD-MSW8x4 14
RS-232 Commands Protocol 17
Technical Specifications 19
How to Contact Key Digital® 21

© 2005 Key Digital®, Inc. All rights reserved.

KDMSW8x4 Operating Instructions

Introduction

The KD-MSW8x4 HDTV Matrix Switcher provides the next generation in professional Video/Audio switching technology. Perfect for both the board room and home entertainment applications, this versatile component is the ideal complement to your video and audio equipment, making possible the interface and transparent switching of up to eight (8) separate HDTV source signals simultaneously, to as many as four (4) independent video displays. In addition, the KD-MSW8x4 HDTV Matrix Switcher can also switch PCM digital and/or left and right audio for as many input/output combinations. The interface is via the BNC type connector array, consisting of eight independent component video/audio inputs and four independent component video/audio outputs, each supporting video formats up to and including 1080P.

HDTV CERTIFIED
480p · 720p · 1080i · 1080p

Typical source components you may need to switch with your KD-MSW8x4 HDTV Matrix Switcher can include the following:

- DVD Players
- Electronic game boxes
- Cable TV, satellite and terrestrial DTV set-top receivers
- Digital Video Recorders
- D-VHS, S-VHS and VHS VCR's

KDMSW8x4_Manual.qxd 1/4/06 1:07 PM Page 2

Key Features

There is so much in store with Key Digital's new Fat Boy Series line of **KD-MSW8x4 HDTV Matrix Switchers:**

- Pristine, crystal-clear switching of ALL your HD and SD analog sources, even 1080p, out to 300 MHz:
  - ⇒ Component Video (YPbPr) or RGBHV Video
  - ⇒ Digital PCM or analog stereo audio
  - ⇒ BNC connectors
  - ⇒ Output video format = Input video format
- Switch like a pro in the Studio:
  - ⇒ All-new "Fade-to-Black" and "Video Muting" features eliminate video "glitches" on your display when you switch your source
- Easy to control and operate, you can switch:
  - ⇒ Manually, using the front panel pushbuttons and LED indicators
  - ⇒ Remotely, using the supplied IR remote control
  - ⇒ Using the RS-232 control
- Instant verification of your switching status, via the convenient front-panel LED's
- So versatile, you can even switch S-Video and Composite Video signals (with the appropriate adapter) from VCR's, digital video recorders and satellite set-top receivers
- Massively expandable, the outputs of the 8x4 can be incremented in steps of 4, providing an unheard-of matrix switching capability all the way up to 8x44
  - ⇒ Purchase multiple units in kits from Key Digital® to meet your expansion needs, from 8x4, to 8x8, to 8x12, … to 8x44

Massively Expandable

These Operating Instructions apply to the entire Key Digital Fat Boy Series line of HDTV Matrix Switchers:

KD-MSW8x4	8 x 4 HDTV Matrix Switcher (single base unit)
KD-MSW8x4-8 x 8	8 x 8 HDTV Matrix Switcher (2 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x12	8x12 HDTV Matrix Switcher (3 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x16	8x16 HDTV Matrix Switcher (4 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x20	8x20 HDTV Matrix Switcher (5 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x24	8x24 HDTV Matrix Switcher (6 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x28	8x28 HDTV Matrix Switcher (7 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x32	8x32 HDTV Matrix Switcher (8 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x36	8x36 HDTV Matrix Switcher (9 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x40	8x40 HDTV Matrix Switcher (10 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x44	8x44 HDTV Matrix Switcher (11 base units of 8x4 and Cable Kit)

Technology

As for all Key Digital® products, it's our custom technology that allows us to deliver the highest standard of picture quality, like:

LHBC Linear High Bandwidth Circuit

Surface Mount Technology

Multi-Layer Board Technology

KDMSW8x4_Manual.qxd 1/4/06 1:07 PM Page 4

GETTING STARTED

The KD-MSW8x4 HDTV Matrix Switcher is capable of switching eight (8) sets of three-wire component (YPbPr) video and/or five-wire component (RGBHV) video, as well as analog/digital audio to any or all of the four outputs (typically your displays or projectors). If your source device output is on a VGA connector, you will need a breakout cable to RGBHV on separate BNC connectors. The KD-MSW8x4 HDTV Matrix Switcher is also capable of switching S-Video and composite video signals (with the appropriate adapter) from VCR's, digital video recorders and satellite set-top receivers. The default video signal format for the KD-MSW8x4 HDTV Matrix Switcher is three-wire Component Video (YPbPr).

All input/output combinations are configurable via the front panel pushbuttons and clearly displayed by LED indicators for each of the output fields. Switching can be accomplished conveniently in any of three ways:

- Manually, using the front panel pushbuttons and LED indicators
- Remotely, using the supplied IR remote control
- Using the RS-232 control

Note: Since the KD-MSW8x4 Matrix Switcher does NOT perform video processing, the output video format is the same as the input video format. This means that the video resolution is not changed and also that if you input one form of video, for example Component Video, the output will be in exactly the same format.

Open the carton and you will find the following contents:

1. One[1] KD-MSW8x4 HDTV Matrix Switcher unit
2. One (1) +6V DC external Power Supply adapter module[2]
3. IR Remote Control with batteries included
4. RS-232 cable[3] (not provided with the base KD-MSW8x4 unit stand-alone)
5. Operating Instructions Manual
6. Warranty card

CAUTION: If you have purchased an expanded configuration of the Fat Boy series HDTV Matrix Switcher line beyond the base 8x4 Matrix Switcher, the multiple base units will come pre-connected from the factory with a special cable kit that has been tested for your configuration. You are advised NOT to disconnect or reconfigure any of these cables.

[1] These Operating Instructions apply to the entire Fat Boy Series line of massively expandable KD-MSW8x4 HDTV Matrix Switchers. The number of units in your package is listed on the table at the front of these Operating Instructions for the particular configuration you have purchased. If you have purchased a configuration beyond the base 8x4 Matrix Switcher, a Cable Kit has already been installed and tested, and you will also find the RS-232 cable that connects to multiple units.

[2] No other power supply adapter can be used with the KD-MSW8x4 unit; you must use the Power Supply provided! Using a power supply other than the one provided by Key Digital with your unit VOIDS THE WARRANTY, may cause damage to your unit(s) and associated equipment, and is a potential safety hazard.

[3] The RS-232 cable is ONLY PROVIDED FOR FAT BOY EXPANSION. If you have purchased the base KD-MSW8x4 HDTV Matrix Switcher, the RS-232 cable is NOT provided.

Setting up your KD-MSW8x4 HDTV Matrix Switcher for operation:

Your KD-MSW8x4 HDTV Matrix Switcher is easy to configure and operate. In this section, you will first connect all of your A/V Input and Output devices to your KD-MSW8x4 Matrix Switcher unit.

Connecting A/V Equipment

Connecting A/V equipment to the KD-MSW8x4 HDTV Matrix Switcher is straightforward and accomplished easily via the ergonomic rear panel connector array.

CAUTION: When unpacking the unit, make all hookups and connections before plugging in the Power Adapter provided with your unit. Do NOT apply power to the unit until all Video and Audio connections have been made to your KD-MSW8x4 unit(s) from the "Source" devices to the Display(s) and/or Audio system(s). You MUST use the Power Supply provided with your unit or you VOID the Key Digital Warranty and risk damage to your unit and associated equipment.

The KD-MSW8x4 HDTV Matrix Switcher is equipped with professional-grade BNC female connectors. These connectors offer a better match to video cables than do the smaller RCA connectors, as well as providing a positive bayonet lock when installed. Because not all consumer equipment marketed uses BNC connector interfaces, it may be necessary to employ RCA-to-BNC or VGA-to-BNC adapter plugs and/or cable assemblies to interface these various devices to your high-quality Matrix Switcher.

The video signal format must be considered when making connections to the KD-MSW8x4 HDTV Matrix Switcher. Simply match the A/V device's output (be it YPbPr "Component" or RGBHV "VGA" video) to a similar video signal output configuration on the KD-MSW8x4 HDTV Matrix Switcher. In the event that these superior quality output formats are not available on the device in question, then S-Video and/or composite video may also be interfaced with the KD-MSW8x4 HDTV Matrix Switcher with the use of the appropriate adapters.

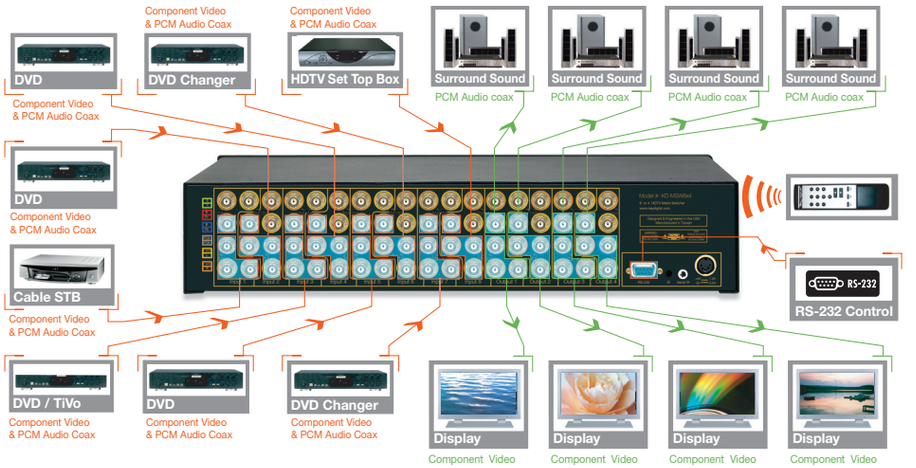
The same consideration applies to the audio interfaces. Both analog and digital output options are provided on the KD-MSW8x4 HDTV Matrix Switcher and may be employed appropriately as analog, when connecting directly to the audio inputs of a video monitor; or as digital, when connecting instead to an A/V receiver having coaxial digital (PCM) interfaces for decoding surround sound signals.

KDMSW8x4_Manual.qxd 1/4/06 1:08 PM Page 6

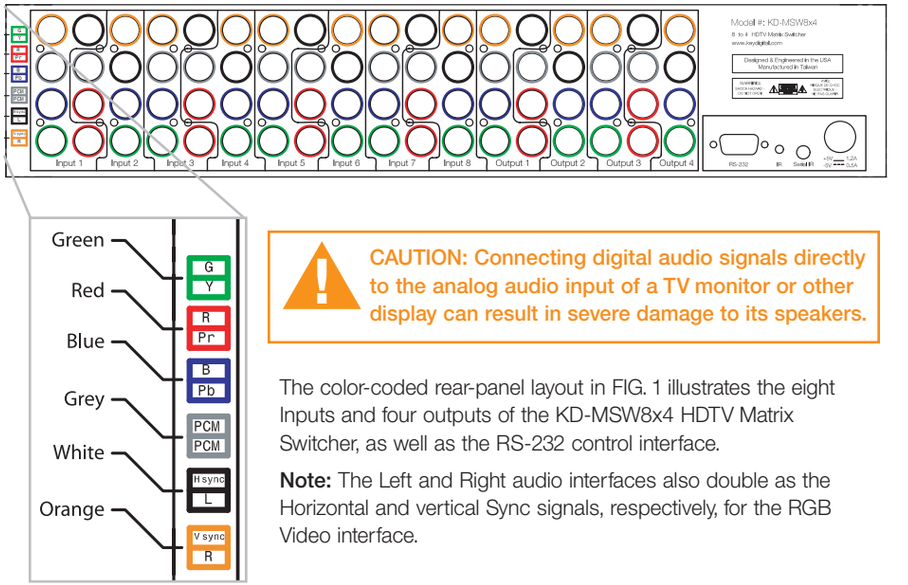
CAUTION: For proper operation of the high quality electrical circuits in your KD-MSW8x4 unit, do NOT "daisy chain" Inputs:

- **Each Input of the MSW8x4 has its own 75 Ohm termination**
- **Do NOT feed a Source to multiple MSW8x4 Inputs without proper Distribution equipment**

Typical Application Example for a base KD-MSW8x4 HDTV Matrix Switcher



Rear panel layout of the KD-MSW8x4 Matrix Switcher



CAUTION: Connecting digital audio signals directly to the analog audio input of a TV monitor or other display can result in severe damage to its speakers.

The color-coded rear-panel layout in FIG. 1 illustrates the eight Inputs and four outputs of the KD-MSW8x4 HDTV Matrix Switcher, as well as the RS-232 control interface.

Note: The Left and Right audio interfaces also double as the Horizontal and vertical Sync signals, respectively, for the RGB Video interface.

High-quality Component Video (YPbPr) and "VGA" (RGBHV) Source Equipment

Some of your source equipment may have an analog video output that is called Component Video. Component Video is a three-wire video format, with the video signals typically labeled YPbPr. Another common analog video output format is RGB (like the "VGA" outputs on your computer), which typically has separate H&V sync signals. The KD-MSW8x4 HDTV Matrix Switcher is the perfect choice for switching Component Video and RGB Video source devices to your displays.

Example: Connecting a digital TV set-top receiver with Component Video three-wire YPbPr or "VGA" five-wire RGBHV video Outputs to the KD-MSW8x4 HDTV Matrix Switcher Inputs.

KDMSW8x4_Manual.qxd 1/4/06 1:08 PM Page 8

YPbPr Component Video

Connect the three-wire green, blue and red YPbPr cables from the set-top receiver of choice, to the green, blue and red color-coded connectors of any one of the eight input fields of the KD-MSW8x4 HDTV Matrix Switcher. Connect the white and red analog stereo audio cables from the set-top receiver to the white and orange connectors of the same input field of the KD-MSW8x4 HDTV Matrix Switcher. If a digital audio coaxial output is available on the set-top receiver, it can then connect to the gray-coded PCM connector on the KD-MSW8x4 HDTV Matrix Switcher.

Connect the green, blue and red connectors from Outputs 1, 2, 3 or 4 on the KD-MSW8x4 HDTV Matrix Switcher to the corresponding component video jacks on your TV or monitor. Connect the white and orange analog audio jacks from the same output to the corresponding white and red audio jacks on your TV or monitor. If digital audio is desired from the set-top receiver, connect a cable from the gray BNC connector in the same chosen output field to your A/V receiver's coaxial digital audio input.

CAUTION: To prevent damage to your equipment, do NOT connect the KD-MSW8x4 HDTV Matrix Switcher digital outputs to either of the analog audio inputs on your TV or monitor!

RGBHV

If the set-top receiver of choice employs RGBHV outputs, a 15-pin 'breakout' adapter cable will need to be used to implement the interface. In this instance connect the red, green and blue BNC connectors from this adapter cable to the red, green and blue connectors, again on any one of the eight input fields, of the KD-MSW8x4 HDTV Matrix Switcher. Connect the black and yellow wires from the breakout cable to the white and orange (analog audio input) connectors in the same input field of the KD-MSW8x4 HDTV Matrix Switcher.

Now connect the desired RGBHV video signal to your monitor or TV, by connecting the red, green, blue, white, and orange connectors of any one of the four output fields of the KD-MSW8x4 HDTV Matrix Switcher, directly to the red, green, blue, black, and yellow input connectors on your monitor or TV. These connectors may also be labeled R, G, B, H, and V. A second 15-pin breakout cable may be required for certain sets.

Note: It is not possible to use analog audio switching when in RGB mode, because the H&V sync signals required for the RGB format will occupy the port connectors typically used for the audio signals. This leaves the option, if desired, of connecting digital audio (PCM) from the set-top receiver to same input and output fields of the KD-MSW8x4 HDTV Matrix Switcher.

This same connection procedure described above applies to any other peripheral device that one may wish to interface with a desired display medium, including DVD players and game consoles.

Lower-quality S-Video (two-wire) or Composite Video (CVBS) Source Equipment

S-Video

A "breakout" adapter cable is required to connect a satellite receiver, DVR, or S-VHS VCR to the KD-MSW8x4 HDTV Matrix Switcher. This cable is equipped with an S-Video (DIN) plug at one end and a pair of BNC plugs at the other connected to white and yellow conductors. Connect the white (Y) conductor to the green BNC connector in the selected input field, and connect the yellow (C) conductor to either the blue or red BNC connector in the same input field. Connect the white and red analog stereo audio connectors of the set-top receiver of choice, to the white and orange connectors in the same input field on the KD-MSW8x4 HDTV Matrix Switcher.

Connect the green BNC connector in the selected output field to the white (Y) conductor of a second S-video to BNC adapter cable. Connect the blue or red connector to the yellow (C) conductor. Plug the other end of the adapter cable into the TV or monitor's S-video input. Connect the white and red analog stereo audio cable connectors to the white and orange connectors of the same KD-MSW8x4 HDTV Matrix Switcher output field. Connect the other end of the audio cable pair to the white and red analog audio input of your TV or monitor.

Composite Video (CVBS) Connection

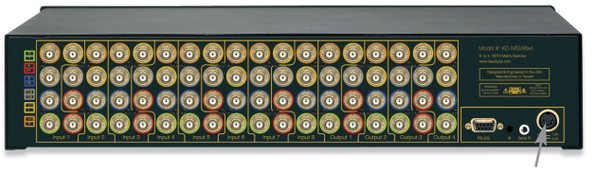
Connect the Composite Video connector (yellow) from your VCR or DVR to the green BNC connector in the selected KD-MSW8x4 HDTV Matrix Switcher input field. Connect another composite video cable from the green BNC connector in the selected output field to your TV or video monitor. Follow the instructions above for connecting analog audio.

Applying power to your unit

CAUTION: No other power supply adapter can be used with the KD-MSW8x4 unit(s); you must use the Power Supply provided! Using a power supply other than the one provided by Key Digital with your unit VOIDS THE WARRANTY, may cause damage to your unit and associated equipment, and is a potential safety hazard.

Now that the installation is completed, it is recommended to double check all connections before connecting the external power supply. Once every connection has been verified, plug the connector of the Power Supply into the power input jack of the KD-MSW8x4.

KDMSW8x4_Manual.qxd 1/4/06 1:08 PM Page 10



Carefully insert the Power Supply adapter plug, here

Next, plug the external Power Supply provided with your unit into an appropriate* wall outlet.

***Power Requirements**

- Each unit draws 0.9A,100-240 VAC
- External power supply provided:
- + 6V DC @ 5 Amps, 110-240 VAC, 50-60 Hz

You MUST use the Power Supply that came with your unit:

+ 6V DC @ 5 Amps, 110-240 VAC, 50-60 Hz

For added safety and protection it is always recommended to use a good quality surge protector.

Always test all connections and final operation first, before sealing cables behind walls or completing difficult wire routings. Use a reliable "Source" to test your connections (like a DVD player) before routing or hiding any wires behind walls or ceilings.

BASIC OPERATION

A "Matrix Switcher" allows you to select any input device, and have it available on the output (typically a display) of your selection. For example, not only can you select your DVD player as the source of video for your enjoyment from your total array of source devices like Set Top Boxes and DVR's, but you can also direct the DVD player to appear on your HDTV or any particular display you have connected to the output of your Matrix Switcher, while you monitor other sources on other displays under your command.

An "8x4" Matrix Switcher:

Select Video Source #1 to Display A
Select Video Source #7 to Display B
Select Video Source #3 to Display C
Select Video Source #5 to Display D

Video Source#	Display A	Display B	Display C	Display D
1	→			
2				
3	→	→		
4				
5	→	→	→	→
6				
7	→	→		
8				

All input/output combinations are configurable via the front panel pushbuttons and clearly displayed by LED indicators for each of the output fields. Switching can be accomplished conveniently in any of three ways:

- Manually, using the front panel pushbuttons and LED indicators
- Remotely, using the supplied IR remote control
- Using the RS-232 control

Manual configuration of A/V Inputs and Outputs

Manual routing of video and audio signals from the available inputs to selected outputs is easily implemented on the KD-MSW8x4 HDTV Matrix Switcher using the front panel pushbuttons, and visually verifiable via the LED indicator array for each of the four output fields.

The front panel of the KD-MSW8x4 HDTV Matrix Switcher provides the user with a visual representation of the four output fields. Each of these four segments consists of a large pushbutton and an array of eight LED indicators. Each of these appropriately numbered LED indicators corresponds to one of the eight available inputs.

Once the input source devices and the output displays have been connected to the KD-MSW8x4 HDTV Matrix Switcher they can easily be configured into desired combinations using these simple pushbuttons.

Note: If depressing the front panel pushbuttons has no effect, please be sure your unit is not in the Front Panel Lockout Mode. Refer to the section in the IR Remote Control later in this manual. You may need to depress the R1 key followed by "0" to enable the front panel pushbuttons.

KDMSW8x4_Manual.qxd 1/4/06 1:08 PM Page 12

To switch an A/V device input to the intended one of the four outputs requires depressing the pushbutton corresponding to the chosen output field, as necessary, until the LED indicator corresponding to the chosen input is lit. The video and audio sources connected to that input are automatically switched to the selected output. The KD-MSW8x4 HDTV Matrix Switcher can simultaneously route a single input to all of the four outputs by simply repeating the same procedure for each of the four output fields.

Fade-to-Black and Video Mute pro-features

Two new features have been added to this generation of Key Digital® switchers, called "Fade-to-Black" and "Video Mute." Both of these features let you switch like a pro, like in a live studio.

The **Fade-to-Black feature** allows for switching between input/output combinations without the usual visual signal noise that traditionally accompanies switching between video signals. The video image momentarily goes to black as the KD-MSW8x4 HDTV Matrix Switcher selects between inputs for the chosen output.

An additional related feature, available on the KD-MSW8x4 HDTV Switcher, is the **Video Mute**, which enables the user to mute the video signal (the display goes to black) at the chosen output.

IR REMOTE CONTROL

The KD-MSW8x4 HDTV Matrix Switcher can be operated remotely using the supplied infrared (IR) remote control. As many as fifteen individual KD-MSW8x4 HDTV Switchers can be addressed by the same remote control using the few simple functions designed into the system.

Selecting input and output combinations with the IR Remote

Configuring a particular unit (the Fat Boy series allows multiple units of the KD-MSW8x4 base unit operate together for installations requiring more than 4 displays*) with the desired input and output combination requires the following successive steps:

1. Addressing desired Unit:

Depress numerical digits 01 to 15 (16 is the default address of the stand alone / base unit and does not require selection)

2.Addressing desired Output:

Depress numerical digits 1 to 4

3.Addressing desired Input:

Depress numerical digits 1 to 8 (or use UP and DOWN arrows keys)

***Note:** The KD-MSW8x4 HDTV Switcher is massively expandable in increments of four (4) Outputs by purchasing multiple units from Key Digital® that have been pre-wired and configured with a special cable kit. For example, by combining as many as 11 base 8x4 units together, offers the KD-MSW8x4-8x44 HDTV Matrix Switcher package that provides 8x44 Matrix Switching (that is, any of 8 inputs to up to as many as any of 44 outputs). For such applications, each unit must be addressed separately unless the system is under RS-232 control.

Video Mute

1. Addressing desired unit: Same as above
2. Depress R1 key (LED array begins to flash)
3. Depress numerical digits 1 to 5 for output selection (5 selects all outputs). The ten-second window, within which to make selection, is indicated by the flashing LED array.
4. Using UP and Down arrows, Mute (UP) or Un-mute (DOWN) Video output

I/O Video Signal Formatting

1. Follow Video Mute procedure steps 1 to 3
2. Depress numerical digits 7 to select RGBHV mode or 8 to return to YPbPr mode (default)

KDMSW8x4_Manual.qxd 1/4/06 1:08 PM Page 14

Lockout Mode for Front Panel Pushbuttons

1. Depress the R1 key followed by "9" to disable the front panel pushbuttons (Note that in this mode, pressing the front panel pushbuttons will have no effect)
2. Depress the R1 key followed by "0" to enable the front panel pushbuttons

Lockout Mode for IR Remote

1. Depress R3 key and hold until LED array stops flashing (IR remote is now locked)

Working in the Lockout Mode for the IR Remote

1. Depress R2 key
2. Depress numerical output address
3. Depress numerical input address

Exiting the Lockout Mode for the IR Remote

1. Depress R3 key and hold until LED array stops flashing (IR remote is now unlocked)

FAT BOY EXPANSION OF THE BASE KD-MSW8x4

The Application Example provided earlier serves to illustrate the versatility of the KD-MSW8x4 HDTV Matrix Switcher, as the ideal interface device for virtually all user video and audio equipment input and output configuration needs. Additionally the KD-MSW8x4 HDTV Matrix Switcher is expandable to as many as 44 configurable outputs, allowing for even greater input/output flexibility for the given eight input fields. The expansion feature is factory installed and shipped to the consumer as a pre-wired combination of two or more KD-MSW8x4 HDTV Matrix Switchers.

CAUTION: If you have purchased an expanded configuration of the Fat Boy Series HDTV Matrix Switcher line beyond the base 8x4 Matrix Switcher, the multiple base units will come pre-connected from the factory with a special cable kit that has been tested for your configuration. You are advised NOT to disconnect or reconfigure any of these cables.

The KD-MSW8x4 HDTV Matrix Switcher is available in the following expansion packages, configured to provide input/output combinations ranging from 8x8 up to 8x44 (eight inputs x forty-four outputs).

The entire Key Digital Fat Boy Series line of HDTV Matrix Switchers

KD-MSW8x4	8 x 4 HDTV Matrix Switcher (single base unit)
KD-MSW8x4-8 x 8	8 x 8 HDTV Matrix Switcher (2 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x12	8x12 HDTV Matrix Switcher (3 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x16	8x16 HDTV Matrix Switcher (4 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x20	8x20 HDTV Matrix Switcher (5 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x24	8x24 HDTV Matrix Switcher (6 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x28	8x28 HDTV Matrix Switcher (7 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x32	8x32 HDTV Matrix Switcher (8 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x36	8x36 HDTV Matrix Switcher (9 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x40	8x40 HDTV Matrix Switcher (10 base units of 8x4 and Cable Kit)
KD-MSW8x4-8x44	8x44 HDTV Matrix Switcher (11 base units of 8x4 and Cable Kit)

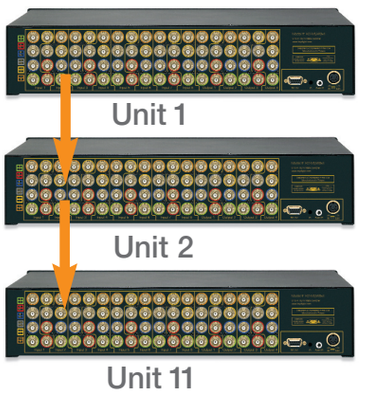
Fat Boy Expansion: Theory of Operation

The Fat Boy KD-MSW8x4 HDTV Matrix Switcher series is expandable to as many as 44 configurable outputs, allowing for even greater input/output flexibility for the given eight input arrays. This expansion feature is factory installed and shipped to the consumer as a pre-wired and pre-tested combination of from two up to eleven KD-MSW8x4 HDTV Matrix Switchers. The expansion packages are comprised of multiple KD-MSW8x4 units ganged together.

In the expansion configurations, the individual connectors of each input array, on each unit, are connected to all other corresponding input array connectors on all of the other units (up to eleven units for the massive KD-MSW8x4-8x44 8x44 HDTV Matrix Switcher configuration) of a given expanded package. Each of the eight combined input fields is then supplied with a single input array (R, G, B, PCM Audio, Left Audio and Right Audio). The resulting output arrays (eight, or twelve, or sixteen, … up to 44), depending on the expansion package chosen, are configurable in the same way as those of a single switcher. The stand-alone or combined package KD-MSW8x4 HDTV Matrix Switcher is addressable in the same manner as described prior, using either the supplied IR Remote Controller or via the RS-232 control port.

Using the same application example illustrated previously, the user will note that the input video and audio sources remain the same. The signals for each of the inputs shown are supplied to each of the additional units of a given expanded package via the parallel connection array described earlier. The output array available (up to 44 with 11 base KD-MSW8x4 units) now offers you additional interfaces for display devices and/or surround sound systems.

CAUTION: Do not tamper with factory installed wiring as this may lead to improper functioning of equipment and conceivably cause damage to the same.



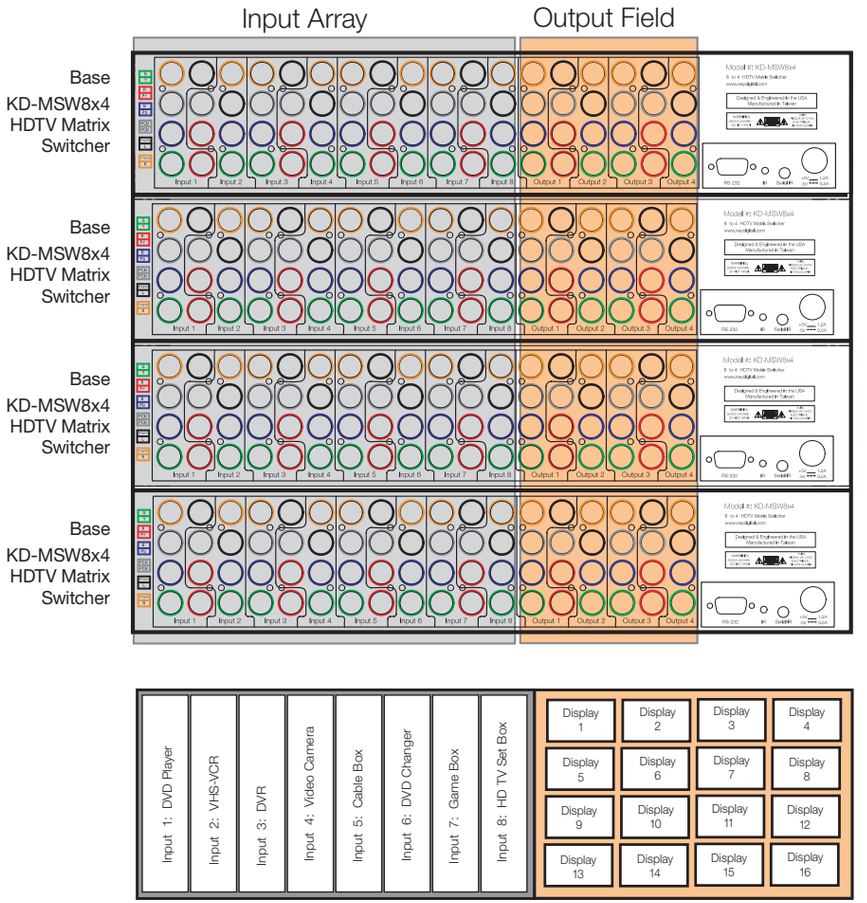
The combined units provide the user with a virtually unlimited output capability (up to 44). As illustrated previously in this manual, up to eight individual inputs are available for an array of source devices, ranging from VCR's to DVD players and HDTV Set Top boxes.

The following Expansion Application Example is that of an expanded KD-MSW8x4 HDTV Matrix Switcher Package (8x16). The four 8x4 interconnected switcher units provide, for the eight segment input field (shown in gray), additional interfacing with an expanded array of sixteen (16) individual outputs (shown in red). The necessary wiring is factory installed and the expanded switcher package shipped to the consumer ready for connection to the video and audio equipment of choice.

KDMSW8x4_Manual.qxd 1/4/06 1:08 PM Page 16

Typical Fat Boy KD-MSW8x4 Expansion Application Example for a KD-MSW8x4-8x16:

Four (4) KD-MSW8x4 base units configured from the factory to provide 8x16 HDTV Matrix Switching



RS-232 COMMANDS PROTOCOL

The KD-MSW8x4 HDTV Switcher can also be remotely controlled via its RS-232 port by systems such as Crestron, AMX, ELAN, and Control4, utilizing industry standard commands PROTOCOL:

- 4800 Baud rate
- 8 data bits
- 1 Stop bit
- No parity

For the base KD-MSW8x4 HDTV Matrix Switcher, you must supply your own RS-232 cable and insert carefully in the back of the unit.

For the Fat Boy expansions, your units come pre-configured from the factory with their own RS-232 cable for you to use to connect to your PC or Control System.

The commands list for the KD-MSW8x4 HDTV Switcher is as follows:

1. I/O switching command:

CCxy

x = output position (1...4), y = input position (1...8)

2. Status command:

CCww

Note: Since both commands are of a defined length, no terminator is required.

Both commands give the following response:

a) UUy1y2y3y4n

b) Y1y2y3y4 - input states (1...8)

c) N- unit number (1...15)

3. Address command:

CCA<number (1~16)>

CCA16 : Selects default KD-MSW8x4 HDTV Switcher (non addressable)

CCA01~15 : Selects the KD-MSW8x4 HDTV Switcher corresponding to that pre-determined numerical address

Note: In the addressable mode, you must replace CC with the Address Number CC only works in the default mode, address 16

KDMSW8x4_Manual.qxd 1/4/06 1:08 PM Page 18

4. Video mute command:

CCm<number (1~5)> : Enable mute

CCn<number (1~5)> : Disable mute

5. Video fade interval selection command:

CCi<number (0~9)>

CCi0 : No mute

CCi1 : 28 ms mute

CCi2 : 40 ms mute

CCi3 : 80 ms mute

CCi4 : 120 ms mute

CCi5 : 160 ms mute

CCi6 : 240 ms mute

CCi7 : 320 ms mute

CCi8 : 400 ms mute

CCi9 : 600 ms mute

6. Video signal format command:

CCOR : RGBHV component mode

CCOC : YPbPr component mode (factory default)

Note: If this bit is not set correctly, the video mute function will not function

7. Factory default command:

CCF0 : Will reset memory

Inputs for every output will be 1

Unit number (address) will be 16

Mute Interval will be 240 ms8.

8. Front Panel Pushbutton commands:

d: Disable front panel pushbutton controls

e: Enable front panel pushbutton controls

9. IR Remote Control commands:

I: Disable IR Remote Control

u: Enable IR Remote Control

TECHNICAL SPECIFICATIONS

Note: The following Technical Specifications are for a base KD-MSW8x4 HDTV Matrix Switcher. The Technical Specifications for Expansion configurations scale accordingly, with the outputs incrementing in steps of four (4). The expansion packages are comprised of multiple KD-MSW8x4 units ganged together and tested from the factory with a special cable kit.

Inputs and Outputs

- Eight input arrays and four output arrays, each consisting of three component YPbPr analog video connectors, two analog audio connectors and one PCM digital audio connector
- The Output format and resolution = the format and resolution of the selected Input source
- The analog audio input/output connectors also serve as the Horizontal and Vertical sync for RGBHV signals
- Massively expandable
- Base KD-MSW8x4 unit Outputs expandable in increments of 4
- Multiple units ganged together and tested from the factory provide up to 44 outputs (requires 11 base units) for true 8x44 HDTV Matrix Switching

Video

- Three BNC-type color-coded input connectors (YPbPr, RGB)
- 1V p-p @ 75 ohms, terminated
- 300 MHz video bandwidth
- Composite video sync on "Y" input (YPbPr)
- The analog audio input/output connectors also serve as the Horizontal and Vertical sync for RGBHV signals
- Also supports S-Video and Composite Video (CVBS)
- Professional Fade-to-Black and Video Mute features provided

Analog Audio

- Two BNC-type color-coded input connectors (L, R)
- High-impedance (1K ohm) line level inputs

Digital Audio

- One BNC-type color-coded input connector
- Standard PCM digital format

Compatible Video Signals

- Compatible with all standard analog video signal formats that use 50Hz or 60Hz refresh rates, including:
- 1080p, 1080i, 720p, 576p, 576i, 540p, 480p, 480i

Bandwidth

- -3 dB @ 300 MHz
- Linear phase pass-band

KDMSW8x4_Manual.qxd 1/4/06 1:08 PM Page 20

Video Gain

- Unity gain for YPbPr and RGBHV

Mechanical

- Size: 17" x 10" x 3.5"
- Weight: 10 lbs.
- Enclosure Type: Metal
- Rack Mount Size: 2 RU, brackets included

Power Requirements

- Each unit draws 0.9A,100-240 VAC
- External power supply provided:
- + 6V DC @ 5 Amps, 110-240 VAC, 50-60 Hz

CAUTION: No other power supply adapter can be used with this unit! Using a power supply other than the one provided by Key Digital with your unit VOIDS THE ENTIRE PRODUCT WARRANTY, may cause damage to your unit and associated equipment, and is a potential safety hazard. This also applies to each unit in the Fat Boy Series expansion of the base KD-MSW8x4 unit.

How to contact Key Digital®

Repairs and Warranty Service

- Should your KD-MSW4x1 HDTV Fat Boy Series Switcher require warranty service, please contact Key Digital® to obtain a Returned Materials Authorization (RMA) number
- Please contact us at either:
- Phone: 1-914-667-9700
- E-mail: tech@keydigital.com

Technical Support

- For technical questions about using our products, please contact us at either:
- Phone: 1-914-667-9700 or Toll-free 1-888-258-2028
- E-mail: tech@keydigital.com

Customer Support

- For customer support questions about using our products, please contact us at either:
- Phone: 1-914-667-9700
- E-mail: customersupport@keydigital.com

WARRANTY

All Key Digital® products are built to high manufacturing standards and should provide years of trouble-free operation. They are backed by a limited two-year parts and labor warranty.